DOCUMENT RESUME

ED 251 466 SP 025 632

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TITLE Effects of Perceptual-Motor Training on Perceptual-Motor Development in Children.
PUB DATE 31 Mar 84
NOTE 15p.; Paper presented at the Convention of the American Alliance for Health, Physical Education, Recreation and Dance (Anaheim, CA, March 31, 1984).
PUB TYPE Speeches/Conference Papers (150) -- Information Analyses (070)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Child Development; *Cognitive Development; Concept Formation; Elementary Secondary Education; *Learning Readiness; Motor Development; *Perceptual Motor Learning; *Program Effectiveness; Student Characteristics; Student Needs

ABSTRACT

Perceptual-motor activities are being recognized as possible contributors to the general readiness of children for learning through the development of perceptual-motor abilities. The contribution of perceptual-motor activities to specific perceptual readiness skills is being reexamined. Readiness programs are generally designed to help children to develop concepts and, through reinforcement, to develop basic cognitive understandings. Remedial perceptual-motor training programs have been established as a means of alleviating perceptual inadequacies and of increasing academic achievement and cognitive abilities. Research findings on the efficacy of various types of perceptual-motor training programs agree that children's individual characteristics and needs are the major determinants of a program's effectiveness. Whether there is a strong link between improved perceptual-motor abilities (effected through motor training) and increased academic achievement and cognitive abilities is still questionable. (JD)

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EFFECTS OF PERCEPTUAL-MOTOR TRAINING ON PERCEPTUAL-MOTOR DEVELOPMENT IN CHILDREN*

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During the past several years perceptual-motor training programs have sprung up across North America. In the 1960s and early 1970s several of these programs were given considerable exposure in the popular press and professional literature. Based on these articles and the claims of some, many people formed the impression that these programs were panaceas for the development of both cognitive and motor abilities. Considerable confusion and speculation developed over the values and purposes of perceptual-motor training programs. Programs adhering to one technique or another emerged almost overnight. All too often, people were inadequately trained, ill informed, and frankly, not clear on just what they were trying to accomplish. The smoke has now cleared. Concerned educators are taking a closer, more objective look at perceptual-motor training programs and their role in the total educational spectrum. Instead of claiming that they are panaceas of adhering to one training technique or another, many are viewing perceptual-motor programs as important facilitators of readiness in young children. Perceptual-motor activities are being recognized as possible contributors to the general readiness of children for learning through the development of perceptual-motor abilities. The contribution of perceptual-motor activities to specific perceptual readiness skills is being closely reexamined.

Readiness programs may be classified as concept developing, and concept reinforcing. Concept development programs are generally designed for children who for a variety of reasons have been limited or restricted

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*Paper presented at the Anaheim, California Convention of the AAHPERD, March 31, 1984.

in their experiential background (e.g., socioeconomic status, prolonged illness, television, computer games).

Concept reinforcement programs are those in which movement is used in conjunction with traditional classroom techniques to develop basic cognitive understandings. In this type of program, movement is used as an aid or vehicle for reinforcing various cognitive concepts in science, mathematics, language arts, and social studies dealt with in the classroom.

Remedial training programs are the third and more controversial type of perceptual-motor training program. They have been established as a means of alleviating perceptual inadequacies, increasing academic achievement, and cognitive abilities. The avowed purpose of these programs is to enhance academic achievement. There is, however, little solid support for this claim although abundant testimony and opinions are available. Figure 1 presents an overview of the various types of perceptual-motor training programs.

The physical education literature is replete with developmental skills and activities. For years, physical education and classroom teachers alike have been promoting learning readiness through physical activities. The majority have not been fully aware of the magnitude of the contribution that they have been making to children's development.

The development and refinement of children's spatial world and their temporal world are the two primary contributions of perceptual-motor training programs to perceptual-motor development. The jargon used in programs across North America varies greatly. There does seem, however, to be some agreement that the perceptual-motor qualities depicted in

Figure 2 are among the most important to be developed and reinforced in children by the physical education teacher.

The vast majority of available data concerning the efficacy of perceptual-motor training has shown only slightly positive or no significantly meaningful effects. However, based on their 1976 review, Myers and Hammill (1976) stressed that a few well designed studies have in fact, found significant results. This fact should not be overlooked since it implies that positive effects may be provided by some presently undiscovered conditions. In other words, for some children, perceptual-motor training may be remarkably beneficial. In this regard, Keogh (1978) stated that the decision of whether a specific program is appropriate for a given child with specific needs, depends on "the nature of the child and the program interations" (p. 96).

Based on their 1982 analysis of the effectiveness of perceptual-motor training programs, Myers and Hammill (1982) made the following recommendations with regard to needed perceptual-motor research (See Figure 3):

> "1. Identifying the characteristics of children for whom training has been demonstrated to be beneficial.
> 2. Determining the optimal amount and type of training necessary to produce real perceptual and/or motor growth.
> 3. Demonstrating that perceptual-motor processes can actually be improved as a result of training." (p. 416)

With regard to the identification of the characteristics of children who have benefited from perceptual-motor training, a 1983 meta-analysis study conducted by Kavale and Matteson (1983) reported that the mentally retarded (both TMR & EMR) and the motor disabled benefited more from perceptual-motor training programs than both "normal" children and "learning disabled" children (See Table 1).

Their analysis also indicated that, although quite small, positive results were found at all grade levels including high school age subjects (See Table 2). This reinforces the fact that the focus of perceptual-motor training programs should be based on the child's needs. Therefore, teachers should try to match various approaches to perceptual-motor training to the identified needs of their students and refrain from the temptation of using a favored method.

With regard to the second recommendation by Myers and Hammill (1982), namely, determining the optimal amount of time and training needed to produce real changes, the effects of perceptual-motor training have typically been studied using a between groups design. The experimental and control groups have been compared and then concluded that one was, or was not, more effective than the other. This between groups approach assumes that the characteristics of children within groups are homogeneous and randomly distributed. When considering children's developmental variability this approach just may be too simplistic. Children who have experienced a history of school failure will probably need a variety of treatments involving numerous instruction options. Therefore, program efficacy should be established from specific variables <u>within</u> treatment groups rather than between groups. When teachers or researchers try to fit the child to the program, the question of efficacy of perceptual-motor training may be enlarged. However, when they try to match the program to the child, teachers may not need to adhere as closely to the efficacy issue.

In terms of the effects of perceptual-motor training on the improvement of perceptual-motor abilities themself, meta-analysis (Kavale & Mattson, 1983) and other research (Lerch et al. 1974, Mercer, 1983)

has shown small but relatively greater effects in this area than in academic achievement and cognition (See Tables 3, 4, & 5). Therefore, one should not rush to connect improvement in motor skill learning with that in cognitive learning.

As Cruickshank (1981), Gallahue (1982), Keogh (1978), Myers and Hammill (1982), and Seefeldt (1974, 1977) have all pointed out: the effects of perceptual-motor training programs are still highly experimental and speculative. It may be that quality physical education programs result in positive changes in affective, social, and motivational response patterns of children and that these factors have an <u>indirect</u> influence on the acquisition of perceptual-motor abilities. Whether there is a strong link from motor training to improved perceptual-motor abilities, to academic achievement and cognition is questionable.

Table 1. Average Effect Sizes for Grade Level*

Level	Number of effect sizes	Mean	Standard error	Percentile equivalent
Preschool	47	.053	.038	52
Kindergarten	129	.099	.026	54
Primary (Grades 1-3)	226	.079	.023	53
Middle (Grades (4-6)	74	.066	.023	53
Junior high school	94	.085	.036	53
High school	67	.088	.034	54

From: Kavale, K., & Mattson, P.D. One jumped off the balance beam: Meta-analysis of perceptual-motor training. Journal of Learning Disabilities. 1983, 16, p.170.

Table 2. Average Effect Sizes for Perceptual Motor Outcome Classes*

Outcome Class	Number of Effect Sizes	Mean	Standard error	Percentile equivalent
Perceptual/sensory motor	233	.166	.017	56
Academic achievement	283	.013	.018	50
Cognitive/aptitude	95	.028	.023	51
Adaptive behavior	26	.267	.072	61

*From: Kavale, K. and Mattson, P.D. "One Jumped Off the Balance Beam: Meta-Analysis of Perceptual Motor Training", Journal of Learning Disabilities, 1983, 16, p. 167.

Table 3. Average Effect Size for Subject Groups*

Subject	Number of effect sizes	Mean	Standard error	Percentile equivalent
Normal	58	.054	.044	52
* Educable mentally retarded (IQ = 50-75)	143	.132	.033	55
* Trainable mentally retarded (IQ = 25-50)	66	.147	.027	56
Slow learner (IQ = 75-90)	14	.098	.062	54
Culturally disadvantaged	85	.045	.042	52
Learning disabled	77	.018	.029	51
Reading disabled	74	.007	.024	50
* Motor disabled	118	.121	.026	55

From: Kavale, K., & Mattson, S.D. One jumped off the balance beam: Meta-analysis of perceptual-motor training. Journal of Learning Disabilities, 1983, 16, p. 170.

Table 4. Average Effect Sizes for Perceptual Motor General Outcome Categories*

General ourcome categories	Number of effect sizes	Mean	Standard error	Percentile equivalent
Perceptual/sensory motor				
* Gross motor	44	.214	.046	58
* Fine motor	28	.178	.039	57
Visual perception	145	.149	.022	56
Auditory perception	16	.122	.062	55

*From: Kavale, K., & Mattson, P.D. One jumped off the balance beam: Meta-analysis of perceptual-motor training. Journal of Learning Disabilities, 1983, 16, p.167.

Table 5. Average Effect Sizes for Perceptual Motor Specific Outcome Categories

	Special outcome categories	Number of effect sizes	Mean	Standard error	Percentile equivalent
	Gross motor skills				
*	Body awareness/image	22	.256	.070	60
*	Balance/posture	14	.263	.096	60
	Locomotor skills	8	-.017	.122	49
	Visual perceptual skills				
*	Visual discrimination	31	.146	.068	56
*	Figure-ground discrimination	28	.173	.047	57
*	Visual-motor ability	26	.222	.051	59
	Visual integration	17	.086	.097	54
*	Visual spatial perception	16	.144	.079	56
	Visual memory	15	.062	.098	53
	Reading achievement				
	Word recognition	36	-.016	.049	49
	Comprehension	33	-.055	.059	48
	Oral reading	17	-.037	.103	48
	Vocabulary	25	-.012	.035	50
	Speed/rate	8	-.038	.172	48

*From: Keogh, B.K. Noncognitive aspects of learning disabilities: Another look at perceptual-motor approaches to assessment and remediation. In L. Oettinger (Ed.), The psychologist, the school, and the child with MBD/LD. N.Y.: Grume & Stratton, 1978.

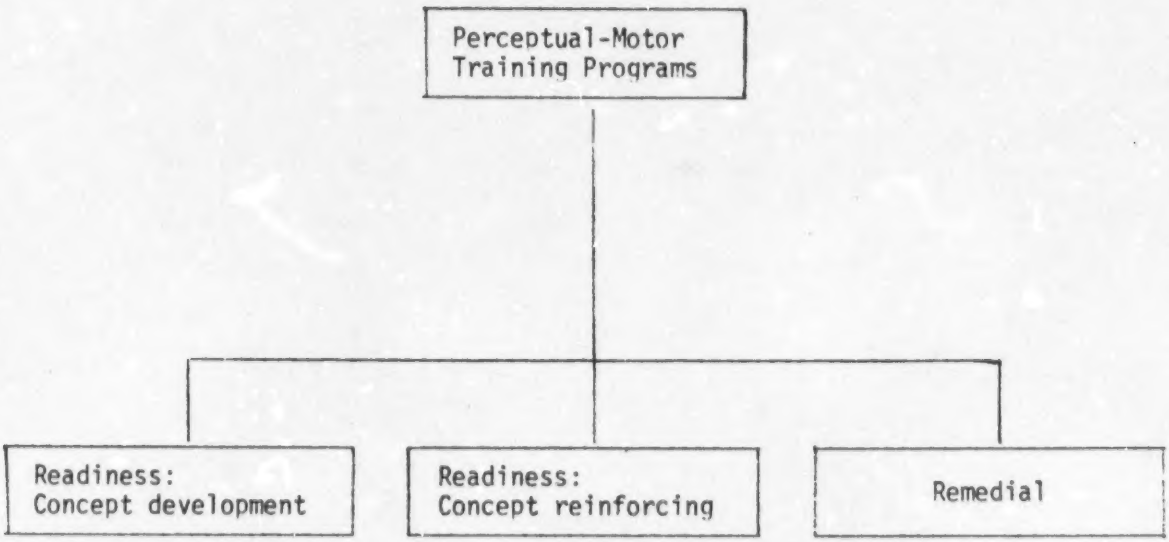
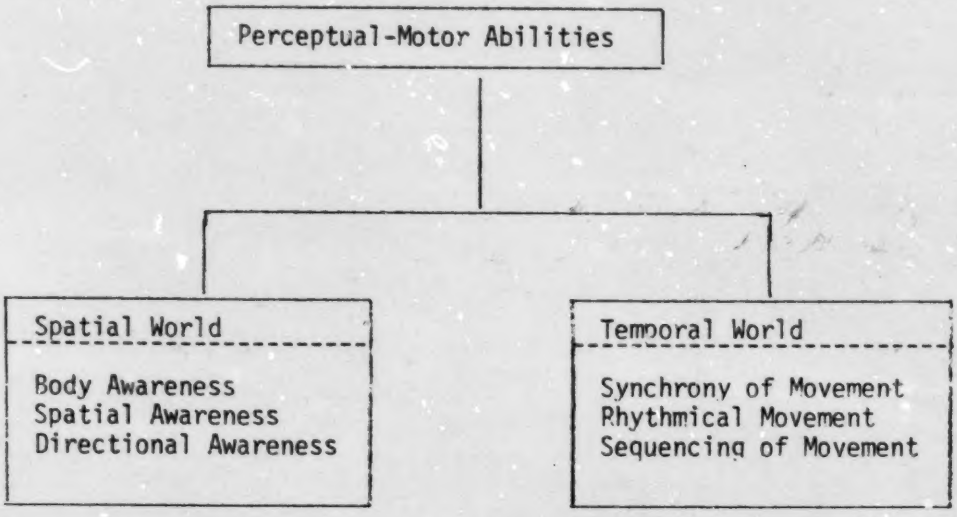


Figure 1. Three types of perceptual-motor training programs.

Figure 2. The Aspects of Perceptual-Motor Development



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3. Demonstrating that perceptual-motor processes can actually be improved as a result of training." (p. 416)

Figure 3. Recommendations For Needed Perceptual-Motor Research*

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*Myers, P.I., and Hammill, D.D. Learning disabilities: basic concepts, assessment practices, and instructional strategies. Austin, Texas: Pro-Ed., 1982, p. 416.

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